UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/942,001	08/29/2001	Otto Lodewijk Steinbusch	NL 000477	9027

24737 7590 08/13/2004		

PHILIPS INTELLECTUAL PROPERTY & STANDARDS
P.O. BOX 3001
BRIARCLIFF MANOR, NY 10510

EXAMINER
STEELMAN, MARY J

ART UNIT	PAPER NUMBER
2122	

DATE MAILED: 08/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	09/942,001	STEINBUSCH ET AL.
	Examiner	Art Unit
	Mary J. Steelman	2122

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>29 August 2001</u>.

2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-8</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-8</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>08/29/2001</u> is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>8/29/01, 7/18/02</u>.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

1.   Claims 1-8 are pending.

Priority

2.   Acknowledgment is made of applicant's claim for foreign priority based on an application

filed on 08/29/2001. It is noted, however, that applicant has not filed a certified copy of the

foreign priority document application as required by 35 U.S.C. 119(b).

Information Disclosure Statement

3.   IDS received 8/29/2001 and 7/15/2002 has been considered.

Drawings

4.   The drawings are objected to under 37 CFR 1.83(a) because they fail to show any details

as described in the specification. Any structural detail that is essential for a proper understanding

of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected

drawing sheets are required in reply to the Office action to avoid abandonment of the application.

Any amended replacement drawing sheet should include all of the figures appearing on the

immediate prior version of the sheet, even if only one figure is being amended. The figure or

figure number of an amended drawing should not be labeled as "amended." If a drawing figure

is to be canceled, the appropriate figure must be removed from the replacement sheet, and where

necessary, the remaining figures must be renumbered and appropriate changes made to the brief

description of the several views of the drawings for consistency. Additional replacement sheets

may be necessary to show the renumbering of the remaining figures. The replacement sheet(s)

should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to

obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the

applicant will be notified and informed of any required corrective action in the next Office

action. The objection to the drawings will not be held in abeyance.

Drawings should describe the invention.

Specification

5.   Page 2, line 25 recites "theprogram", should be –the program--. Separate the two words

with a space.

6.   Examiner objects to the arrangement of the content of the Specification.

Content of Specification

(a)   <u>Title of the Invention</u>: See 37 CFR 1.72(a) and MPEP § 606. The title of the invention should be placed at the top of the first page of the specification unless the title is provided in an application data sheet. The title of the invention should be brief but technically accurate and descriptive, preferably from two to seven words may not contain more than 500 characters.

(b)   <u>Cross-References to Related Applications</u>: See 37 CFR 1.78 and MPEP § 201.11.

(c)   <u>Statement Regarding Federally Sponsored Research and Development</u>: See MPEP § 310.

(d)   <u>Incorporation-By-Reference Of Material Submitted On a Compact Disc</u>: The specification is required to include an incorporation-by-reference of electronic documents that are to become part of the permanent United States Patent and Trademark Office records in the file of a patent application. See 37 CFR 1.52(e) and MPEP § 608.05. Computer program listings (37 CFR 1.96(c)), "Sequence Listings" (37 CFR 1.821(c)), and tables having more than 50 pages of text were permitted as electronic documents on compact discs beginning on September 8, 2000.

Or alternatively, <u>Reference to a "Microfiche Appendix"</u>: See MPEP § 608.05(a).
"Microfiche Appendices" were accepted by the Office until March 1, 2001.

(e)   <u>Background of the Invention</u>: See MPEP § 608.01(c). The specification should
        set forth the Background of the Invention in two parts:

        (1)   <u>Field of the Invention</u>: A statement of the field of art to which the
                invention pertains. This statement may include a paraphrasing of the
                applicable U.S. patent classification definitions of the subject matter of the
                claimed invention. This item may also be titled "Technical Field."

        (2)   <u>Description of the Related Art including information disclosed under 37
                CFR 1.97 and 37 CFR 1.98</u>: A description of the related art known to the
                applicant and including, if applicable, references to specific related art and
                problems involved in the prior art which are solved by the applicant's
                invention. This item may also be titled "Background Art."

(f)   <u>Brief Summary of the Invention</u>: See MPEP § 608.01(d). A brief summary or
        general statement of the invention as set forth in 37 CFR 1.73. The summary is
        separate and distinct from the abstract and is directed toward the invention rather
        than the disclosure as a whole. The summary may point out the advantages of the
        invention or how it solves problems previously existent in the prior art (and
        preferably indicated in the Background of the Invention). In chemical cases it
        should point out in general terms the utility of the invention. If possible, the
        nature and gist of the invention or the inventive concept should be set forth.
        Objects of the invention should be treated briefly and only to the extent that they
        contribute to an understanding of the invention.

(g)   <u>Brief Description of the Several Views of the Drawing(s)</u>: See MPEP § 608.01(f).
        A reference to and brief description of the drawing(s) as set forth in 37 CFR 1.74.

(h)   <u>Detailed Description of the Invention</u>: See MPEP § 608.01(g). A description of
        the preferred embodiment(s) of the invention as required in 37 CFR 1.71. The
        description should be as short and specific as is necessary to describe the
        invention adequately and accurately. Where elements or groups of elements,
        compounds, and processes, which are conventional and generally widely known
        in the field of the invention described and their exact nature or type is not
        necessary for an understanding and use of the invention by a person skilled in the
        art, they should not be described in detail. However, where particularly
        complicated subject matter is involved or where the elements, compounds, or
        processes may not be commonly or widely known in the field, the specification
        should refer to another patent or readily available publication which adequately
        describes the subject matter.

(i)   Claim or Claims: See 37 CFR 1.75 and MPEP § 608.01(m). The claim or claims
        must commence on separate sheet or electronic page (37 CFR 1.52(b)(3)). Where
        a claim sets forth a plurality of elements or steps, each element or step of the
        claim should be separated by a line indentation. There may be plural indentations
        to further segregate subcombinations or related steps. See 37 CFR 1.75 and
        MPEP § 608.01(i)-(p).

(j)   Abstract of the Disclosure: See MPEP § 608.01(f). A brief narrative of the
        disclosure as a whole in a single paragraph of 150 words or less commencing on a
        separate sheet following the claims. In an international application which has
        entered the national stage (37 CFR 1.491(b)), the applicant need not submit an
        abstract commencing on a separate sheet if an abstract was published with the
        international application under PCT Article 21. The abstract that appears on the
        cover page of the pamphlet published by the International Bureau (IB) of the
        World Intellectual Property Organization (WIPO) is the abstract that will be used
        by the USPTO. See MPEP § 1893.03(e).

(k)   Sequence Listing, See 37 CFR 1.821-1.825 and MPEP §§ 2421-2431. The
        requirement for a sequence listing applies to all sequences disclosed in a given
        application, whether the sequences are claimed or not. See MPEP § 2421.02.

Claim Objections

7.   Claim 8 recites "A method according to Claim 4...", should be –A method according to

Claim 5...-- Examiner will treat this claim as if it was dependent upon claim 5.

Additionally, claim 8 recites "virtual branch back instruction...". Editing these phrases to

"virtual machine branch back instruction" would make it more consistent with the limitations of

claim 5, thus more clear.

Claim Rejections - 35 USC § 112

8.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the
subject matter which the applicant regards as his invention.

9.   Claims 6 and 7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite

for failing to particularly point out and distinctly claim the subject matter which applicant

regards as the invention.

10.   Claim 6 recites the limitation "the loop body" in line 3. There is insufficient antecedent

basis for this limitation in the claim. Claim 7 recites the limitation "the loop body" in line 7.

There is insufficient antecedent basis for this limitation in the claim.

11.   Claims 3 and 7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite

for failing to particularly point out and distinctly claim the subject matter which applicant

regards as the invention. Claims 3 and 7 recite "said range of addresses" in the last line. It is

unclear as to whether this refers to the previous "range of addresses" or "further range of

addresses", as recited in the 3rd line.

Claim Rejections - 35 USC § 103

12.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

13.   Claims 1, 2, 3, 5, 6, and 7 are rejected under 35 U.S.C. 1032(a) as being unpatentable

over US Patent 5,768,593 to Walters et al.

Per claim 1:

-A data processing system for executing a program of virtual machine instructions with a

processor core that is arranged to execute native instructions comprising: the processor core; a

memory;

(Walters: FIG. 1, col. 5, line 66-col. 6, line 10, "...computer system...includes central

processing unit...and memory...")

-a virtual machine interpreter for receiving virtual machine instructions selected dependent on

program flow during execution of the program, the virtual machine interpreter being coupled to

the processor core to generate native machine instructions that implement the virtual machine

instructions for execution by the processor core, the virtual machine interpreter being arranged

(Walters: Col. 3, lines 34-41, "...cross-compilation and emulation subsystem and method for

converting, at run time, non-native code into native code immediately prior to execution of that

code..." col. 4, lines 8-13, "Qualifying non-native code comprises all code that is reachable from

the entry point instruction during execution of the program without going outside the

compilation window and without having to first execute (A) an instruction by the interpreter...")

-to identify an initial virtual machine instruction from a body of successive

ones of the selected virtual machine instructions, where the body is expected to be executed

repeatedly;

(Walters: Col. 3, line 62- col. 4, line 3, "...cross-compiler begins compilation of a code block

having an entry point instruction composed of the aforementioned next non-native instruction.

If, during decoding of the entry point instruction by the cross-compiler it is determined that the

entry point instruction is one of a predefined set of non-native instructions to be executed by an

interpreter, then that instruction is executed by the interpreter. Otherwise, the cross-compiler

continues with compilation of a block of non-native code.")

-to record a correspondence between the initial virtual machine instruction in

the body and a memory location in the memory;

(Walters: Col. 4, lines 38-42, "...cross-compiler maintains a 'code chunk map' for

indicating...code cache stores...")

-to write native instructions for the body into the memory from said memory

location, the native instructions for the body being generated for virtual machine instructions

starting from the initial virtual machine instruction;

(Walters: Col. 6, lines 52-58, "...hash table lookup...native code block corresponding to a non-

native application code block having a specified entry point...", col. 7, lines 52-55, "If the entry

point instruction in the non-native code application does not correspond to a code block in the

code cache, the recompiler begins recompilaton of the corresponding code block.", col. 13, lines

6-10, "...generating the native code for the qualifying non-native instructions by executing the

code generation procedures noted in the information table for all qualifying instructions. After

the native code is generated, the resulting native code block is stored in the code cache....")

-to cause the processor core to execute the native instructions for the body and

to repeat execution of the native instructions for the body by executing the written native

machine instructions for the body from memory starting from said memory location.

(Walters: Col. 3, lines 45-53, "Whenever the data processor on which the cross-compiler is

being used executes a non-native application, the cross-compiler is activated. The cross-

compiler remains in control of program execution until execution of a native code

application...is initiated...")

Walters did not disclose specifically, loop instructions, "where the body is expected to be

executed repeatedly". However, Walters did provide incentive for such consideration. Col. 2,

line 66-col. 3, line 5, "Since conditional branch instructions are often used at the end of

execution loops in programs, conditional branch instructions are often executed large numbers of

times. The inventors of the present invention have determined that optimization of the cross-

compilation of such instructions is likely to have a disproportionately beneficial affect on the

execution performance of cross-compiled programs.

Therefore, it would have been obvious, to one of ordinary skill in the art, at the time of

the invention, to have modified Walters disclosed invention to include the translation and of loop

constructs (likely to be executed repeatedly) when optimizing code.

Per claim 2:

-the virtual machine interpreter being arranged to generate a native branch back instruction to the

start of the body and placing the native branch back instruction at the end of the body in the

memory.

It is well known that a block of code representing a loop will end with a branch back instruction to the start of the body. A block of code for a loop, compiled to native code will have the native branch back instruction at the end of the body.

Therefore, it would have been obvious, to one of ordinary skill in the art, at the time of the invention that the cross-compiler, as disclosed by Walters, which compiles non-native code sections into native code sections, would place a native branch back instruction at the end of the body for the purpose of control flow.

Per claim 3:

-the virtual machine interpreter being arranged to place an unconditional further native branch instruction behind the native branch instruction, the unconditional further native branch instruction having a target address in a range of addresses that does not overlap a further range of addresses in which the body is stored, the virtual machine interpreter being arranged to monitor a program counter address of the processor core and to resume selection of the virtual machine instructions and generation of native machine instructions from the selected virtual machine instructions when the program counter address enters said range of addresses after execution of the loop body.

It is well known that a block of code representing a loop will end with a branch back instruction, the instruction possibly followed by an alternate branch (If condition is true, branch to A, else branch to B...). Compiled native code, as disclosed by Walters, is stored separately from the non-native code (col.13, lines 6-10). Walter's invention will resume selection of non-native instructions (virtual machine instructions) Walter: Col. 9, line 64-col. 10, line 1, "Each

exit instruction in the compiled native code stores a non-native program counter

value...designates the location of the next non-native instruction...to be executed, and then

returns control to the recompiler..."

Therefore, it would have been obvious, to one of ordinary skill in the art, at the time of

the invention that the cross-compiler, as disclosed by Walters, which compiles non-native code

sections into native code sections, would place a native branch back instruction at the end of the

body and possibly, additionally, follow the conditional branch instruction with an alternate

unconditional branch instruction for the purpose of control flow..

Per claim 5:

A method of executing a program of virtual machine instructions with a processor core that is

arranged to execute native instructions, the method comprising

(Walters: FIG. 1 & Col. 3, lines 34-41, "...subsystem and method for converting...", col. 6,

lines 1-10, "...CPU...")

-selecting, under control of program flow, virtual machine instructions to be executed;

(Walters: Col. 3, lines 47-53, "The cross compiler remains in control...code in non-native

applications...is processed by the cross-compiler..."

-determining native instructions from the selected virtual machine instructions,

to implement the selected virtual machine instructions;

(Walters: Col. 3, lines 56-57, "...cross-compiler looks up the address of that next instruction in the hash table...")

-identifying an initial virtual machine instruction from a body of successive

ones of the selected virtual machine instructions that is expected to be executed repeatedly;

(Walters: Col. 3, lines 62-64, "...cross-compiler begins the compilaton of a code block having an entry point instruction...")

-recording a correspondence between the initial virtual machine instruction and

a memory location;

(Walters: Col. 4, lines 38-42, "...cross-compiler maintains a 'code chunk map' for indicating...")

-writing native instructions for the body into a memory from said memory

location, the native instructions for the body being determined from virtual machine

instructions starting from the initial virtual machine instruction ;

(Walters: Col. 4, lines 38-45, "...code chunk map will store...for each page that contains a non-native entry point instruction...")

-causing the processor core to execute the native instructions for the body and

to repeat execution of the native instructions for the body by executing the written native

machine instructions for the body from memory starting from said memory location.

(Walters: Col. 3, lines 37-41, "code cache for storing cross-compiled code, a hash table for

locating code block in the code cache, a cross-compiler for converting blocks of non-native..."

col. 3, lines 47-50, "The cross-compiler remains in control of program execution until execution

of a native code application is initiated...")

Walters did not disclose specifically, loop instructions, "where the body is expected to be

executed repeatedly". However, Walters did provide incentive for such consideration. Col. 2,

line 66-col. 3, line 5, "Since conditional branch instructions are often used at the end of

execution loops in programs, conditional branch instructions are often executed large numbers of

times. The inventors of the present invention have determined that optimization of the cross-

compilation of such instructions is likely to have a disproportionately beneficial affect on the

execution performance of cross-compiled programs.

Therefore, it would have been obvious, to one of ordinary skill in the art, at the time of

the invention, to have modified Walters disclosed invention to include the translation and of loop

constructs (likely to be executed repeatedly) when optimizing code.

Per claim 6:

-generating a native branch back instruction to a start of the body and placing the native branch

back instruction at the end of the loop body in the memory.

(See limitations addressed in claim 2 above.)

Per claim 7:

-placing an unconditional further native branch instruction behind the native branch instruction,

the unconditional further native branch instruction having a target address in a range of addresses

that does not overlap a further range of addresses in which the body is stored, the method

comprising the step of monitoring a program counter address of the processor core and to resume

said selecting and determining when the program counter address enters said range of addresses

after execution of the loop body.

(See limitations addressed in claim 2 above.)

14.   Claims 4 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent

5,768,593 to Walters et al., in view of US Patent 5,872,978 to Hoskins.

Per claim 4:

Walters disclosed:

-the virtual machine interpreter the virtual machine interpreter recording said correspondence

and writing the native instructions for the body when program flow reaches the initial virtual

machine instruction.

(See limitations addressed in claim 1.)

        Walters failed to address the use of 'hints' when compiling. However Hoskins suggested

that (col. 4, lines 56-58) "hints...act to improve the efficiency of the translation process." Col. 4,

line 11, "The following are examples of suitable hints...", col. 4, lines 39-41,

"BRANCH_LIKELY This tells the translator that the conditional branch instruction following

this hint is more likely to be taken than not."

Therefore, it would have been obvious, to one of ordinary skill in the art, at the time of

the invention, to include "hints" as a technique for optimal compiling because it helps the

translator to know which instructions will more likely benefit from being compiled into native

code, thereby executing faster.

Per claim 8:

Walters disclosed:

-preprocessing the program to detect loop terminating with a virtual branch back instruction;

(Loop termination is followed by a branch back to the virtual (non-native instruction). Col. 9,

line 64-col. 10, line 1, "Each exit instruction in the compiled native code stores a non-native

program counter value...designates the location of the next non-native instruction..."

Walters failed to address the use of 'hints' when compiling. However Hoskins suggested

that (col. 4, lines 56-58) "hints...act to improve the efficiency of the translation process." Col. 4,

line 11, "The following are examples of suitable hints...", col. 4, lines 39-41,

"BRANCH_LIKELY This tells the translator that the conditional branch instruction following

this hint is more likely to be taken than not."

and adding a hint to the program which identifies a target address of the virtual branch

back instruction as the initial virtual machine instruction.

Therefore, it would have been obvious, to one of ordinary skill in the art, at the time of

the invention, to include "hints" as a technique for optimal compiling that "identifies a target

address of the virtual branch back instruction as the initial virtual machine instruction" (program

knows location of the non-native instruction to return to after executing native code) because
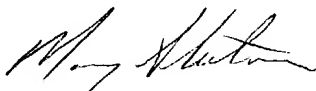
ensures proper control flow.

Conclusion

15.   The prior art made of record and not relied upon is considered pertinent to applicant's
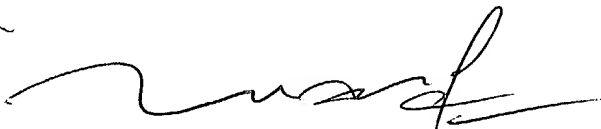
disclosure.

16.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Mary Steelman, whose telephone number is (703) 305-4564. The

examiner can normally be reached Monday through Thursday, from 7:00 A.M. to 5:30 P.M.   If

attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan

Dam can be reached on (703) 305-4552.

The fax phone number is (703) 872-9306 for regular communications and for After Final

communications. Any inquiry of a general nature or relating to the status of this application or

proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Mary Steelman

08/04/2004

TUAN DAM
SUPERVISORY PATENT EXAMINER